US Army Corps of Engineers®

R&D Program: TOWNS

Work Unit: Low-Cost Deployable Piezometric Measuring Columns

Volunteers fight the relentless Mississippi River after flood waters seeped under a sandbag levee in Davenport, Iowa. Seepage was a common problem for many river communities during the flood.
Tower Times 7

Needs & Problems Addressed:

- Knowing pore pressure level in levee foundations is critical to identify potential for seepage-caused failures
- Conventional piezometers require extensive maintenance, wiring, special power, and a junction box
- Levee and floodwall failure by underseepage is difficult to detect and monitor with conventional geotechnical engineering tools

Objectives:

- Develop a low cost piezometric column device
  - –Zero maintenance and vandalism potential
  - –Provides piezometric information during a major flood at any time over the next ten years

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Work Unit Funding Profile:

FY03	FY04	FY05	Total
$ 60k	$ 60k	$ 20 k	$ 140k

Comments on funding

- Modest funding level for well-defined product

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Business Program/Missions Areas Supported:

- Inland Navigation __ %
- Coastal Navigation __ %
- Coastal Storm Damage Reduction __ %
- Inland Flood Control/Damage Reduction 70 %
- Environmental Protection & Quality __ %
- Multi-Purpose (Hydropower, Rec & Water Supply) __ %
- Emergency Management 30 %
- Regulatory __ %
- Support for Others __ %

(Must to add to 100%) Total: 100 %

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CW Strategic Goals Check List: (check if applies)

- Provide sustainable water resources development & mgmt _X_
- Restore past environment degradation ___
- Provide project services of high quality _X_
- Reduce losses from natural & manmade hazards _X_
- Supports being a world class technical leader _X_
- Addresses strategic or system needs in a framework or integrated approach by developing:
  - Methods or decision support tools _X_
  - Technology to improve life cycle productivity _X_
  - Technology to monitor systems, provide feedback and develop operating guidance ___

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Which “short term” field needs does this support:

- Improves efficiencies in O&M of Corps projects
- Enhances service life of projects by providing early detection of changes in seepage
- Expedites project-level decision making for O&M and emergency operations
- Increases public safety by providing information about embankment stability

Field Review Group Relative Ranking:

- FRG planned for 21-22 AUG 02

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Listening Sessions Check List: (check if applies)

- Improves data sharing/exchange with the public in these areas:
  - Provides one stop shop for maps & data for basin wide planning ___
  - Provides data to make informed decisions _X_
  - Provides a system for basin wide planning ___
  - Provides information about what is happening at Corps facilities _X_ (up to date web sites)
- Tech Transfer plan to include educating the public _X_
- Coordinate research, models, analysis with regulatory agencies to insure results will be accepted _X_
- Develop R&D products:
  - For watershed management plans, not just at the project level ___
  - To include aesthetics as components of all projects ___
- Create better models for ground & surface water ___

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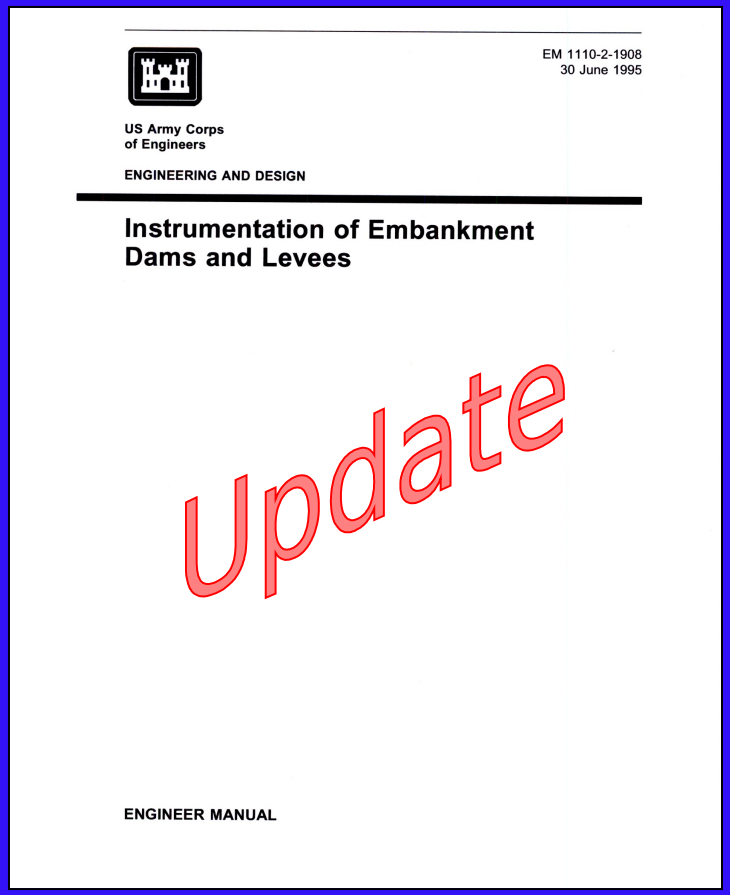
Products:

- TN: Document piezometer performance
- TN: Piezometer specifications
- TN: document monitoring network design and performance
- User's manual for software
- TN: Documentation of field demonstration
- EM update



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Benefits

- Direct:
  - Reduced cost and effort to install and monitor piezometer networks with low maintenance and vandalism potential
  - Potential significant ROI

- Indirect:
  - Minimize property losses and damage
  - Greater structural aesthetics
  - Provide fundamental knowledge of structural integrity

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Technology Transfer Plan:

- Develop low-cost deployable piezometric measuring column
- Provide specifications for piezometers and monitoring network
- Monitoring software and interfaces
- Documentation of field demonstration of monitoring network

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Why should the Corps fund this R&D, instead of private industry and/or others:

- Little incentive for private industry to develop methods to monitor dam and levee seepage since most are federal, state, or local government property

What is Impact if not started:

- Potential failure of levees or dam embankments without warning
- Higher O&M costs when damage detected only after large changes in seepage
- Less effective emergency operations